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FOUR KINDS OF MATERIALS LITTER POTENTIALS AS SUBSTITUTION MATERIAL FOR MEDIA GROWS OF WHITE OYSTER MUSHROOM *(Pleurotus ostreatus)*

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ABSTRACT

Oyster mushroom is a material which is often eaten as a vegetable that contains many proteins that are not high cholesterol. Oyster Mushrooms are cultivated by farmer in agribusiness. Oyster mushroom can be cultivated in an artificial medium term is the Baglog ie artificial media that comes from wood that has rotted and has been stored or wrapped in plastic and has been sterilized to place the mushrooms grow.

The use of sawdust as an artificial medium for the cultivation of oyster mushrooms is a problem for farmers who wish to pursue oyster mushrooms, but there is no place or where the producers found a little sawdust. Therefore it must be examined on material substitution could replace sawdust as the main ingredient of artificial media for the cultivation of oyster mushrooms. Treatment research is to test the four kinds of materials litter (sawdust material as a substitute) that is Trithonia green material (T), green material Leucaena leucocephala (L), dry hay (J) and yard waste (S). Each material composted for 10 days (T1), 15 days (T2) and 20 days (T3).

Observation method was used identification methods for observation qualitatively baglog quality thin and thick oyster mushroom mycelium growth. Quantitative identification methods on the element performed content analysis on each litter compost materials as wood substitute materials and also on the percentage growth of oyster mushroom mycelium.

Parameters were identified for qualitative baglog: baglog condition, density and perfection of form baglog. Qualitative identification of elements within the compost for the content of litter: the pH, organic C, total N, C/N ratio, organic materials, phosphorus element, the element potassium, water content, lignin and cellulose. Observations include mycelium growth of thick and thin mycelium and mycelium each week percentage growth.

Materials litter from thitonia greenery, lamtoro greenery, dry straw and yard garbage can be used as raw material to grow the media making the white oyster Mushroom (Baglog). Content of elements in compost compared litter element content in the sawdust (as control) was Tithonia compost litter from the lignin and cellulose content is low, Lamtoro litter phosphorus content and low cellulose, Straw litter high organic C content and C/N ratio is low and Organic waste in yards of material content, low phosphorus and lignin.

Baglog formed, qualitatively, yet provides a solid form derived from Standard and Poor Perfect baglog sawdust (control). Baglog from the compost tends to be less dense, less regular shape and soft. Mycelium can grow up to form the stems of fruit grow on the media (baglog) derived from litter compost material. Mycelium growth began to appear 2 weeks after inoculation and was beginning to look torso starting age of 5 weeks after inoculation.

Keywords: Bag log, Fruit Torso, Mycelium and Pine Litter,

INTRODUCTION

Oyster mushroom is one of product that is now being sought public both as food and medicine. Oyster mushroom cultivation is still often done during in the highlands because ecology is the desired low temperature with high humidity levels. Oyster mushroom can be cultivated in an artificial medium term is the baglog of artificial media or materials derived from wood lignin that have been weathered and stored or wrapped in plastic and has been sterilize for a place to grow the mushrooms (Cahyana, 1999).

Media used are usually composed of lignin material for oyster mushrooms, including the type of wood mushrooms. Media used consisted of a variety of ligneous materials other than it also contains nutrients needed for growth of oyster mushrooms. Wood used should have rotted into powder, it is intended that the compounds contained in wood is easily digested by the fungus that allows the growth of oyster mushrooms would be better (Moerdiati, Widaryanto and Budi, 2003).

The use of sawdust as an artificial medium for oyster mushroom cultivation is a problem for farmers who want to pursue arises of oyster mushrooms, but there is no place or where the producer found a little sawdust. To overcome this problem, we need to study other materials to substitute wood powder, followed by the composting process. Raw materials were selected from woody material, rich in nutrients and easy to get around the area where the farmers cultivate oyster mushrooms. The composting process needs in order to the availability of nutrients needed for the growth of mold fungi in order to obtain the maximum production in a shorter time than the original mediated growth (Sawdust).

Substitution material selected should have the criteria or characteristics similar to sawdust and has adequate nutrition to support the growth of oyster mushroom (Anonymous, 2001). Substitute materials to grow mushrooms media have several criteria must be met, among others, contains lignin, cellulose, fiber and contain many nutrients and avoid the sap of the material that will be used as the main ingredient for media of oyster mushroom (Sanders, 1982). Furthermore Wahyudi, Husen and Santoso (2002) is most needed nutrients for mycelia growth and development of fruit body consists of lignin, cellulose, hemicelluloses and protein after decomposes will produce nutrients needed by the mushroom. There are a lot of cellulose in woody fibers and materials such as straw, weeds, leaves, and seeds (Anonymous, 2005). To increase the available nutrients and nutrient ready to use the materials need to be processed into compost. Composting is a biological process by microorganism separately or together in decorticating a kind of organic material into humus material.

The aim of the study is to get artificial planting media from materials other to grow oyster mushroom in order to obtain material substitution (of the litter material) and obtained a solution for farmers who had difficulty getting the basic materials of sawdust.

MATERIALS AND METHODS

The research was conducted in Mojokerto - East Java from July 2009 until November 2009. Activities include composting process, the analysis of elemental content after composting and making growth media (baglog). Composting and making growth media in Mojokerto and analysis for elemental content conducted at the Laboratory of Analysis of Fertility in the Faculty of Agriculture UPN "Veteran" East Java.

The treatment is to test four types of litter material (sawdust as a material substitution), namely Thithonia (T) green material, Leucaena leucocephala green material (L), dry straw (A) and yard waste (S). Each material is composted for 10 days (T1), 15 days (T2) and 20 days (T3).

Observation method was used qualitative identification to observations bag log quality and thickness oyster mushroom mycelium growth. Quantitative identification method to analysis performed on elemental content in each litter compost materials as wood substitute materials and also on the percentage growth of oyster mushroom mycelium.

The parameters identified for qualitative bag log: Condition bag log, density and perfection of form bag log, qualitative identification of elements within the compost for the content of litter: the pH, organic C, total N, C/N ratio, organic materials, Elements of phosphorus, Potassium, water content, lignin and cellulose. Observations include thickness mycelium growth of mycelium and percentage mycelia growth each week.

RESULTS AND DISCUSSION

Analysis of elemental content of litter composted, were the determination of N, P, K, organic C, C/N ratio, organic matter, and water content. The results can be seen in Table 1.

Table 1. Concentration Nutrient Element Sawdust and Material Substitution That Has Been Composted (There Are 12 Kinds)

To be oven

No Lab	Code	pH 1:2.5 H_2O	pH 1:2.5 KCL 1N	C. organic %	N total	C/N	Organic ingredients	P (HNO_3 + $HClO_4$)	K	Water levels %	Lignin	Cellulose
1	T1	7.9	7.9	34.87	3.03	13	60.33	0.26	1.34	30	11.16	19.91
2	T2	7.2	7.1	38.66	2.84	12	50.09	0.09	2.01	15	14.2	20.64
3	T3	6.4	6.4	32.45	2.35	13	56.15	0.34	1.96	13	16.04	22.94
4	L1	6.4	6.4	43.46	3.20	13	55.17	0.12	0.68	27	22.62	14.5
5	L2	6.1	6	31.71	3.66	8	54.35	0.15	1.05	21	22.09	20.68
6	L3	6.5	6	24.51	3.37	7	42.56	0.17	1	21	27.46	11.48
7	J1	6.7	6.6	28.46	1.14	25	49.25	0.15	1.05	30	9.56	40.36
8	J2	7.2	7.1	29.87	0.93	32	51.67	0.12	1.07	51	8.46	45.84
9	J3	7.1	7.1	30.5	1.26	24	52.94	0.12	0.58	43	10.92	38.67
10	S1	7.2	7.2	19.76	1.02	19	25.99	0.17	0.17	44	13.68	45.69
11	S2	7.1	7.1	19.35	0.88	20	33.46	0.15	0.18	44	15.11	42.44
12	S3	6.9	6.8	23.5	0.85	22	35.02	0.16	0.19	42	18.34	46.1
13	Wood Saw	7.3	7.3	42.35	0.38	111	73.16	0.05	0.04	77	33.14	45.26

From table 1 can be seen that all materials will be used as growth media have pH values approaching the control of media pH values of 6 - 7.3. Water content on all media tested, were likely under the control standard as growth media. It shows that all the tested media conditions are too dry but it has fulfilled one of criterion as a growth medium of white oyster mushroom mycelium; the value of pH 6-7. It is in accordance Adiyuwono (2002), which states that the level of acidity to the media wants to grow mushrooms pH value of 6-7 and this is usually associated with water content values. Excessive moisture content will cause the compost to be used as growth media became anaerobic and will encourage the growth of other microbes or fungi. If the water content of loss, would cause the media is contaminated with fungi bully.

Nutrient level of nitrogen and potassium contained in the materials for the media to grow oyster mushroom mycelium as a whole is higher than the levels contained in the control media, whereas the nutrient content of phosphorus on average at 50% below the control condition except Tithonia compost 15 and 20 days. This indicates the substitution of media tested contain enough nutrients to support the growth of oyster mushroom mycelium. Levels of C/N ratio owned by the controls media have a very high value compared to media substitution. The high value of C/N ratio shows it is still immature and not decompose, so not ready as a supplier of nutrients. Media substitution that has been composted has a value of C/N is low to moderate. A low value will result nutrients are quickly exhausted in the media, therefore the value of C/N ratio in the range of existing good is the 10-20, so that the media is ready to supply food but not too fast and many are available when needed and the mycelium is not so quickly exhausted when the mycelium is still needed for further growth. Lignin and cellulose are major components of oyster mushrooms growing on the media, so that, substitute materials should contain lignin and cellulose as wood mushrooms. oyster mushroom that thrives on media containing wood (lignin and cellulose). According to Wahyudi Hasan and Santoso (2002), the nutrients most needed for the growth of mycelium and fruit body development consists of lignin, cellulose, hemicellulose and protein after decomposed nutrients needed to produce mushrooms.

Testing of potential litter materials was conducted to determine the success of materials substitution that has been composted to use as base material for the manufacture of white oyster mushroom growth media. Activities started with making baglog (growth medium for fungi). After analysis of nutrient content of materials substitution on the next stage is the creation of growth media (baglog) of the material that has been composted litter materials and also from material Sawdust as a control.

Table 2. Qualitative Observations On Baglog (Fungal Growth Media) Of The Material Is Composted Litter.

No	Code	Baglog Condition	Density	Form Perfection
1	T1	Ugly	Less Solid	Dented
2	T2	Ugly	Less Solid	Dented
3	T3	Ugly	Less Solid	Dented
4	L1	Ugly	Less Solid	Dented
5	L2	Medium	Less Solid	Slightly Dented
6	L3	Medium	Less Solid	Slightly Dented
7	J1	Good	Solid	Not Dented
8	J2	Good	Solid	Not Dented
9	J3	Good	Solid	Not Dented
10	S1	Medium	Solid	Slightly Dented
11	S2	Good	Solid Enough	Not Dented
12	S3	Good	Solid Enough	Not Dented
13	K	Good	Solid	Not Dented

Table 2 indicates that the substitute material for fungal growth media (baglog) from various types of litter materials, provides a visually different picture qualifications. The difference caused by inequality of the hardness of the material substitution. Moreover, it can also be caused due to low water levels on substituting ingredients when making yeast growth media (baglog). Low levels of water in hard materials and causing materials to expand but not destroyed so it is hard pressed to obtain solid media. Baglog that are not neutered will generate solid after baglog a dent or soft. To get the log bag a good, solid and does not dent like baglog control it is necessary to note about the roughness of enumeration materials are composted ter and moisture content of materials substitution and CaCO3 and Gypsum have added around 1% and sugar content has been waived because the material contains a lot of material substitution so that the organic material composition does not change the percentage of substitution.

The next stage of growth continued with the observation identification mycelium. If the mycelium able to grow on the medium, it can be said that the media are tested can be used as a medium to grow mushrooms (baglog). The growth of the mycelium began to be observed when already visible white threads (mycelia). The observation can be seen in Table 3.

Table 3. Identification of Mycelium Growth on Various Media and at Several Ages Observation

Treatment Code	Age of observation after incubation															
	2 Weeks		3 Weeks		4 Weeks		5 Weeks		6 Weeks		7 Weeks		8 Weeks	
	% G	T	% G	T	% G	T	% G	T	% G	T	% G	T	% G	T
T1(Thorn Compost 10 days)	70	Medium	90	Thick	100	Thick	100	Thick	100	Thick	100	Thick	100	Thick
T1(Thorn Compost 15 days)	20	Thin	80	Medium	90	Thick	90	Thick	90	Thick	97	Thick	100	Thick
T1(Thorn Compost 20 days)	10	Thin	80	Medium	90	Medium	90	Thick	97	Thick	98	Thick	100	Thick
L1(Leaf Compost 10 days)	40	Medium	80	Thick	90	Thick	100	Thick	100	Thick	100	Thick	100	Thick
L1(Leaves Compost 15 days)	5	Thin	40	Medium	70	Thick	95	Thick	96	Thick	97	Thick	100	Thick
L1(Leaves Compost 20 days)	0	Not Grow	0	Thin	30	Contamination	44	Contamination	67	Contamination	72	Contamination	87	Contamination
J1(Straw Compost 10 days)	80	Medium	90	Thick	90	Thick	100	Thick	100	Thick	97	Thick	100	Thick
J1(Straw Compost 15 days)	80	Medium	70	Thick	90	Thick	90	Thick	100	Thick	100	Thick	100	Thick
J1(Straw Compost 20 days)	10	Thin	50	Thick	60	Thick	100	Thick	100	Thick	100	Thick	100	Thick
S1(Waste Compost 10 days)	10	Thin	20	Medium	50	Medium	80	Medium	90	Medium Growth	95	Medium	100	Medium
S1(Waste Compost 15 days)	20	Medium	90	Medium	90	Medium	100	Medium	100	Medium	100	Medium	100	Medium
S1(Waste Compost 20 days)	20	Medium	90	Medium	70	Thick	90	Thick+ Growth	95	Thick+ Growth	90	Thick+ Growth	100	Thick+ Growth
K (Wooden Powder)	40	Thick	80	Thick	100	Thick	100	Thick+ Growth	100	Thick+ Growth	98	Thick+ Growth	100	Thick+ Growth

G = Growth T = Thickness

Based on observations identification of mycelia growth from the second week up to eighth weeks, it can be said that all media grew from litter material and white oyster mushroom stems can be grown mycelium. Thus we can conclude that litter materials tested could be used as a substitute material for the manufacture of sawdust white oyster mushroom growing media (baglog) in order to support Agribusiness Oyster Mushroom Plan of Medium, so do not depend on material obtained Sawdust and diversity of the basic materials for the manufacture of the media growing oyster mushrooms.

CONCLUSIONS

1. Thitonia litter of forage materials, Leucaena leucocephala forage, dry hay and yard garbage can be used as raw material for the manufacture of white oyster mushroom growth media (Baglog)
2. The process of composting materials in different time is to give the content of different elements in each litter.
3. Elemental content of litter compost compared elemental content at sawdust (as control) was
   a. Tithonia : content of lignin and cellulose is low.
   b. Lantoro : content of cellulose and phosphorus is low.
   c. Rice straw : content of C organic is high and C/N ratio is low.
   d. Garbage : content of organic matter, phosphorus and lignin is low.
4. Baglog formed, qualitatively not provide a solid form. Baglog of compost materials tend to be less dense, irregular shape and soft.
5. Mycelium can grow up to form the stem of fruit grow on the medium (baglog) derived from litter compost materials. Mycelium growth began to appear 2 weeks after inoculation, and was beginning to look the torso from age 5 weeks after inoculation.

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